

XXIX.—*Note on some Chelonian Remains from the London Clay.* By HARRY G. SEELEY, F.G.S., St. John's College, Cambridge.

GLOSSOCHELYS (nov. gen.).

*Chelone harvicensis* (Woodward).

— *planimentum* (Owen).

In his description in the Palæontographical volume for 1849, Professor Owen states that the carapace is 15 inches long and 13 inches wide. The type specimen having perished, there is now no means of verifying these measurements, except from the natural internal cast of the specimen figured. This shows the impression left by the posterior part of the carapace, something of the form of the inner surface of the bones of the anterior part of the plastron and parts of marginal plates, coracoid, scapula, and humerus.

Prof. Owen remarks that in general form this carapace differs from that of the existing Chelones in being less contracted and pointed posteriorly than in *Chelone mydas* and *Chelone caouanna*, and more contracted posteriorly than in *Chelone imbricata*. Attention is also drawn to the great thickness to which the true ribs are developed on the undersides of the costal plates.

From the posterior termination of what Prof. Owen determines to be the eleventh and last neural plate to the anterior border of the fifth costal plate is rather more than nine inches. From the longitudinal median line of the neural spines of the dorsal vertebræ to the marginal plate beyond the termination of the fourth rib is 7 inches; the same measurement is found at the fifth rib. The ribs appear to be cylindrical, and terminate in obtuse longitudinally grooved rods, of which the naked extremity is not less than an inch long; they are about  $\frac{3}{8}$  of an inch in diameter, never more.

The distance from the lateral termination of the fourth rib to the lateral termination of the eighth rib (which is directed rapidly backward) is 10 inches. The interspace between the terminal ends of the eighth pair of ribs is  $5\frac{1}{2}$  inches.

The interspace between the terminal ends of the eighth and seventh ribs is 3 inches, between the seventh and sixth ribs is 2 inches, between the sixth and fifth  $1\frac{3}{4}$  inch, and between the fifth and fourth about 2 inches. The transverse interspace between the marginal plates and the costal plates seems usually to be about 2 inches, or, according to the carapace figured by Prof. Owen,  $1\frac{1}{2}$  inch.

The termination of the pygal end of the shield is very

curious, the characters drawn in Prof. Owen's figure (pl. x.) being repeated in the main in this specimen. The eighth pair of costal plates bear a small tenth pair of ribs\*, supposing the first costal to have had the usual short pair in front of the proper rib of the plate. Behind these ribs and the neural plate marked by Prof. Owen as the ninth (which appears to me to be as *wide* as the preceding one), lies a diamond-shaped terminal part of the carapace. A transverse suture appears to divide it into two nearly equal parts—one anterior, the other posterior. The anterior part shows throughout its length two subparallel longitudinal sutures, which separate a middle part, the neural plate, from what would be a ninth pair of costal plates, though they do not support the ninth pair of ribs.

The posterior half of the diamond shows a transverse suture which separates a narrow anterior piece from the larger posterior trapezoidal plate. If the preceding plates were rightly numbered, these plates would be the eleventh and twelfth neural.

The characters described are, in their essential points, repeated in another carapace, figured by Prof. Owen in pl. x. A†, where the ninth pair of ribs are represented as being prolonged to the marginal plates. That lithograph shows the neural plates to extend far in front of their corresponding costal plates, herein being unlike *Chelone*. It also shows that the neural plates which Prof. Owen has numbered, in plate x., 5, 6, 7, 8, 9, 10, respectively, should be numbered 4, 5, 6, 7, 8, while the plates beyond should be numbered 10 and 11; thus in number the neural plates conform to the Chelonian type, though their arrangement is unlike that in any of the recent genera.

In the typical specimen figured, and in this specimen also, the marginal plates are remarkable for their narrowness; for though of some width from below upward, they seem to be only from an eighth to a quarter of an inch thick; and the specimen now described shows no trace of the ribs being inserted into holes. The pygal plate, presuming such a plate to have existed, must have been of the same thin character as the others. There is no trace of sutures between the marginal plates.

\* "Perhaps no monstrosity would sooner arrest the attention, or excite more wonder in the comparative anatomist, than the appearance in a recent or fossil chelonian of a greater number of pairs of ribs in the carapace than 8" (Owen, *Palæont.* 1851). Yet that condition had already been figured by Prof. Owen (*Palæont.* 1849, t. x. & x. A) without arousing the anticipated emotion.

† Since perished.

At the anterior part of the stone are seen portions of the hyosternal and hyposternal bones, the entosternal and episternal. The hyosternal and hyposternal meet in a transverse suture, and resemble in form those bones in the recent marine Chelonia, differing chiefly in the much greater extent to which the lateral rays approximate; so that the deep and long emargination usual between these bones is almost lost, while the distance from the front lateral margin of the hyosternal to the back lateral margin of the hyposternal is of emyidian shortness. From front to back, in the median line of the skeleton, the hyosternal measures  $4\frac{3}{4}$  inches; from front to back where narrowest, at the side, the same bone measures  $1\frac{3}{4}$  inch. The transverse width of the two hyposternal bones is about 12 inches; the narrowest measurement of the right hyposternal from front to back is  $1\frac{3}{4}$  inch. They terminate in the middle line of the skeleton, and laterally in short digitations. Unlike the marine Chelonia, this animal had the internal surface of these bones convex; their external surface appears to be concave.

Between the inner anterior ends of the hyosternal bones, and touched by them, extends a thin narrow bone for  $2\frac{3}{4}$  inches; it appears to be less than an inch wide; its anterior termination is not seen; but it widens anteriorly after the usual T-shaped pattern of the interclavicle.

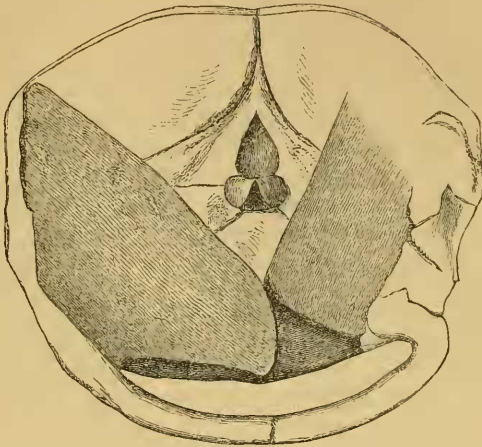
External to the anterior end of the right hyosternal is the right episternal; it is very thin, becomes narrower posteriorly, does not exceed half an inch in width, and is exposed for  $1\frac{3}{4}$  inch.

Over the sternal bones of the right side are the coracoid, scapula, and a part of the humerus. The coracoid is imperfectly preserved; it appears to have been about 4 inches long, and 2 inches wide at the distal termination, very thin, and convex on the *superior* side; its proportions are more in accord with the Emydian type than with that of the marine Chelonians. The scapula measures nearly  $1\frac{1}{2}$  inch from the articular surface to the part where the scapula proper branches at about a right angle from the part called the precoracoid. This latter portion is small, subcylindrical, a little compressed, and about 2 inches long. The scapula is fractured, so that its length is not known.

So far as the remains preserved indicate affinities, the genus may as well have been Chelonian as Emydian, but cannot with certainty be affiliated to either type.

Prof. Owen observes that "this carapace is understood to

have formed part of the same individual turtle as the skull (t. ix.)" on which I now offer a few notes.



Back view of the skull of *Chelone harvicensis* (Woodward), half nat. size, showing the large hyoid bones in shade; between them is seen the tripartite occipital condyle, with the conical foramen magnum above it, and laterally the outlines of the other occipital bones.

*Chelone planimentum* (Owen), Proc. Geol. Soc.  
Palæont. Soc. 1849, pl. ix.

This skull has been very incorrectly figured and imperfectly described.

It is wide behind the orbits, but in front of them tapers more abruptly from side to side and from above downward than shown in the figure, somewhat resembling *Chelone caouanna*.

The nostril is subquadrate, broader than high, about  $\frac{1}{4}$  of an inch wide, and small for the size of the skull when compared with recent marine Chelonians. The premaxillary is a little worn; but the extreme length of the skull from the premaxillary to the occipital condyle is 5 inches; the antero-posterior length to the termination of the supraoccipital crest is  $6\frac{1}{2}$  inches. The maxillary bones look outward, forward, and upward, in this latter character differing from those of the recent marine Chelonia.

The orbits are subcircular, rather less than  $1\frac{3}{4}$  inch in diameter; they look outward and forward and a little upward; and the prefrontal bones which separate them superiorly are little more than an inch wide. At the posterior margin of the orbits the skull is  $3\frac{1}{2}$  inches wide; from the front of the

orbit to the nares is  $\frac{9}{16}$  of an inch. The parietal and frontal bones are deeply marked with scutes, which are represented in Prof. Owen's figure. The head widens to not less than  $5\frac{1}{2}$  inches; but the quadrato-jugal (squamosal, Owen) and squamosal (mastoid, Owen) are imperfectly preserved. The squamosal bone extends further outward, and looks upward more than in marine Chelonians. It appears to terminate behind in a thin film, as in *C. caouanna*. In transverse section the parietal region is similar to that of marine Chelonians, only broader.

The quadrate bone is more conically excavated than in the recent types, but otherwise similar.

So far as they are exposed, the basioccipital, exoccipital, supraoccipital, and paroccipital, Owen, offer no variations from the ordinary type. From the base of the tripartite occipital condyle to the top of the spine of the supraoccipital is  $2\frac{1}{4}$  inches.

The lower jaw is remarkably flattened on the under side. In front of the articulation it measures  $4\frac{1}{2}$  inches from side to side. The symphysis is not less than  $2\frac{1}{2}$  inches long. An obscure suture divides the dentary bone into two parts: Wagler figures a like condition in some recent species of *Trionyx*; and it is shown in Mr. Dinkel's plates to Prof. Owen's monograph, representing *Chelone crassicosata* (t. xi. fig. 3) and *Chelone convexa* (t. vii. fig. 3), but does not occur in the recent marine Chelonia. The lower jaw is not deep from above downward. From the margin of the surangular bone (which in recent species is usually compressed at the upper part) a thin process of bone, an inch long and half an inch wide, is directed upward, outward, and backward towards the malar bone. The ramus measures rather less than 5 inches from front to back. Behind the skull are seen the well ossified hyoid bones; they form on each side of the occipital region a broad, thin, oblique sheet of flat bone, extending from the upper margin of the squamosal bone and approximating to the palate, where (as preserved) they meet or overlap mesially. On the palatal surface they are fractured, and appear there to be about  $\frac{3}{8}$  of an inch thick. So much as is preserved on each side is 4 inches long and fully  $1\frac{1}{2}$  inch wide. The outer margin of each is convex. With the exception of the basihyal, I suppose all the hyoid elements to be here represented in one bone.

The only species from the London Clay which this resembles is *Chelone plana* (Koenig) [*Chelone crassicosata*, Owen], which, however, is represented as having but ten neural plates instead of eleven. It has but eight pairs of ribs attached to

the carapace, instead of nine. The costal plates are shorter from front to back; the free ends of the ribs are wider; the marginal plates appear to be wider. The whole carapace is relatively much wider.

The skull ascribed to that species, as studied from the figure, pl. xi. of Prof. Owen's memoir, shows no character to differentiate it from *C. harvicensis*, other than might be attributed to difference in age and preservation.

Besides the characters enumerated, both these species are distinguished from the recent marine *Chelonia* by the forward position of the first neural plate, from which it results that only one pair of ribs is attached to the first costal plate, as among certain Emydians.

Of the generic distinction of *Chelone harvicensis* from the recent marine types I have no doubt, and, from the characters of the carapace and skull detailed, institute the genus *Glossochelys* for its reception.

The following notes are from additional specimens in the Woodwardian Museum:—

*Glossochelys harvicensis* (Woodward).

A carapace, which may perhaps be from the young of this species, displays the impressions left by the nuchal, first marginal, neural, and eight pairs of costal plates, which are imperfectly preserved at the marginal terminations. The extreme width of the carapace over the third costal plate would be 11 inches; the measurement over the second to the seventh costal plates is about  $7\frac{1}{2}$  inches; in *C. harvicensis*, t. x. A (Owen), these measurements respectively are 15 inches in width by 12 inches in length; so that the specimen now noticed is only about two-thirds as large.

All the plates were exceedingly thin; and the costal plates were concave from front to back, and markedly convex from the neural to the marginal ends. The true ribs appear to have been unusually elevated on the inside of the carapace, often compressed from side to side at their proximal ends, while at the marginal ends they widen and appear to terminate in flattened ribs  $\frac{3}{8}$  of an inch wide. In these characters they differ from the type of *C. harvicensis*.

The nuchal plate is concave in front; behind it unites with the first pair of costal plates by oblique sutures; so that while it is  $1\frac{3}{8}$  inch long mesially in front of the neural plates, it is only  $\frac{3}{4}$  of an inch long at the sides, where it meets the marginal plates. Its extreme width is about  $3\frac{3}{4}$  inches; its least width in front is about 3 inches.

At the upper part of its lateral margin adjoins the flattened marginal plate,  $\frac{3}{8}$  of an inch wide. Between the nuchal and first costal rib there appear to have been three marginal plates, none of which touch the first costal plate.

The first costal plate appears to be an irregular pentagon, about  $1\frac{1}{8}$  inch long at the suture with the first neural plate, nearly  $1\frac{3}{4}$  inch long behind the nuchal plate; behind the marginal plates it again becomes narrow. Herein it is unlike the recent marine *Chelonia*.

The second costal plate, which is less than  $1\frac{1}{2}$  inch long at the neural suture, widens at the marginal end to  $1\frac{3}{4}$  inch. The third and fourth costal plates measure at the neural suture each  $1\frac{5}{6}$  inch, but spread a little towards the marginal ends. The fifth and sixth pairs are not so well preserved, but similarly widen towards the margin, as does the seventh pair. The eighth pair of costal plates is much longer from back to front than the seventh, and, as in the type of *C. harvicensis*, supports the eighth and ninth pairs of costal ribs. Beyond this point the carapace is not preserved.

I anticipate that it will prove to be specifically distinct from the species described, and that the hyosternal bone next noticed may be referred to it.

A nodule exhibiting the greater part of a right hyosternal bone similar in size to that in the typical specimen of *C. harvicensis*. Its shortest measurement, from the deeply cupped front to the hyosternal suture, is about  $1\frac{1}{2}$  inch. At the free marginal side the sharp rays are well seen; they differ from the type in being elevated above the bone on which they rest, much as the rib is elevated in its passage along a costal plate.

Scarcely any group of described vertebrates more urgently demands a renewed critical study than the Tertiary *Chelonia*. The case has yet to be made out which will justify the reference of any one of Prof. Owen's species to the genus *Chelone*, while the majority are obviously Emydians, with very little to even insinuate their affinity with the chelonian suborder, some, like the so-called *Chelone longiceps* (Owen), being valuable new types for comparative study.

*Glossochelys*, if the hyoid bones can be credited with such an inference, may have had a voice like a trumpet, and have served as an alarmist to the gentler inhabitants of the Spice Islands of lat.  $51^{\circ}$  or  $52^{\circ}$ , whenever he gave tongue.